

Itw

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor: Christopher John Evans

Serial No: 10/604,002      Group Art No. 2859

Filed: June 20, 2003      Examiner: Louis M. Arana

For: SPLIT-SHIELD GRADIENT COIL WITH IMPROVED  
FRINGE-FIELD

Attorney Docket No: GEMS 0197 PA

I hereby certify that this correspondence is being deposited with the United States Patent Office as first-class mail in an envelope addressed to: Mail Stop Petitions, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on:

11/24/2004  
Date of Deposit

Louis M. Arana  
Signature

**REQUEST FOR WITHDRAWAL OF ABANDONMENT**

Mail Stop Petitions  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

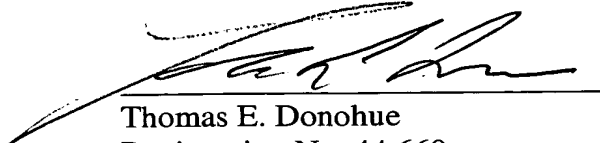
This information is being submitted after Applicant has learned of abandonment on the basis of a Notice of Abandonment mailed October 5, 2004.

The undersigned attests that the response to the Office Action dated February 17, 2004, was submitted on May 17, 2004, in a timely manner. A copy of the Amendment Under 37 CFR §1.111 and Auto-Reply Facsimile Transmittal are submitted herewith.

Acknowledgment of the active status of this application is respectfully requested.

The Commissioner is authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account No. 07-0845.

Respectfully submitted,

A handwritten signature in dark ink, appearing to read "T. Donohue", is written over a horizontal line.

Thomas E. Donohue  
Registration No. 44,660  
28333 Telegraph Road, Suite 250  
Southfield, MI 48034  
(248) 223-9500

Attorney for Applicant

Date: November 24, 2004



## Auto-Reply Facsimile Transmission



TO: Fax Sender at 248 2239522

Fax Information

Date Received:

Total Pages:

5/17/2004 4:00:10 PM [Eastern Daylight Time]

8 (including cover page)

**ADVISORY:** This is an automatically generated return receipt confirmation of the facsimile transmission received by the Office. Please check to make sure that the number of pages listed as received in Total Pages above matches what was intended to be sent. Applicants are advised to retain this receipt in the unlikely event that proof of this facsimile transmission is necessary. Applicants are also advised to use the certificate of facsimile transmission procedures set forth in 37 CFR 1.8(a) and (b), 37 CFR 1.6(f). Trademark Applicants, also see the Trademark Manual of Examining Procedure (TMEP) section 306 et seq.

Received  
Cover  
Page

=====>

MAY-17-2004 15:58 ARTZ ARTZ LAW OFFICES 248 2239522 P. 01/08

### IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Patent Application of:

Christopher John Evans

Serial No.: 10/604,402

Group Art Unit: 2859

Filed: 6/20/2003

Examiner: Louis M. Arena

For: SPLIT-SHIELD GRADIENT COIL WITH IMPROVED FRINGE-FIELD

Attorney Docket No.: GEMS 0197 PUS

I hereby certify that this correspondence is being deposited with the United States Postal Service via facsimile to (703) 872-9306 on:

5/17/2004  
(Date of Deposit)

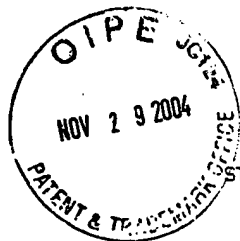
[Signature]  
(Signature)

### AMENDMENT UNDER 37 CFR 1.111

Box Non-Fee Amendment  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

This paper is in response to the first Office Action in the above-entitled application, mailed February 17, 2004, and allowing three months for response. This response is timely because it is being filed within the three month period set for response.

Please amend the above-identified application as follows:



MODE = MEMORY TRANSMISSION

START=MAY-17 15:58

END=MAY-17 16:00

FILE NO.=530

STN NO.	COMM.	ABBR NO.	STATION NAME/TEL NO.	PAGES	DURATION
001	OK	2	17038729306	008/008	00:01:54

-ARTZ ARTZ LAW OFFICES -

\*\*\*\*\* -ARTZ LAW OFFICE - \*\*\*\*\* 248 2239522- \*\*\*\*\*

# IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Patent Application of:

Christopher John Evans

Serial No.: 10/604,402 Group Art Unit: 2859

Filed: 6/20/2003 Examiner: Louis M. Arana

For: SPLIT-SHIELD GRADIENT COIL WITH IMPROVED FRINGE-FIELD

Attorney Docket No.: GEMS 0197 PUS

I hereby certify that this correspondence is being deposited with the United States Postal Service via facsimile to (703) 872-9306 on:

5/17/2004  
(Date of Deposit)

*John A. Hertz*  
(Signature)

## AMENDMENT UNDER 37 CFR § 1.111

Box Non-Fee Amendment  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

This paper is in response to the first Office Action in the above-entitled application, mailed February 17, 2004, and allowing three months for response. This response is timely because it is being filed within the three month period set for response.

Please amend the above-identified application as follows:



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Patent Application of:

Christopher John Evans

Serial No.: 10/604,402

Group Art Unit: 2859

Filed: 6/20/2003

Examiner: Louis M. Arana

For: SPLIT-SHIELD GRADIENT COIL WITH IMPROVED FRINGE-FIELD

Attorney Docket No.: GEMS 0197 PUS

I hereby certify that this correspondence is being deposited with the United States Postal Service via facsimile to (703) 872-9306 on:

5/17/2004  
(Date of Deposit)

*Ken A. Haro*  
(Signature)

AMENDMENT UNDER 37 CFR § 1.111

Box Non-Fee Amendment  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

This paper is in response to the first Office Action in the above-entitled application, mailed February 17, 2004, and allowing three months for response. This response is timely because it is being filed within the three month period set for response.

Please amend the above-identified application as follows:

**IN THE CLAIMS**

1. (Currently Amended) An imaging system comprising:  
A primary gradient coil assembly; and  
A shield coil assembly connected in series to said primary gradient coil assembly, said shield coil assembly comprising:  
a first gradient shield coil; ~~and~~  
a second gradient shield coil connected in parallel to said first gradient shield coil;  
a pair of voltage rails in communication with said first gradient shield coil and said second gradient shield coil;  
a first subcircuit in communication with said first gradient shield coil;  
and  
a second subcircuit in communication with said second gradient shield coil, said first subcircuit and said second subcircuit independently adjustable such that the currents through said first gradient shield coil and said second gradient shield coil may be independently adjusted.
2. (Original) An imaging system as in claim 1 further comprising  
at least one additional gradient shield coil connected in parallel to said first gradient shield coil and said second gradient shield coil.
3. (Currently Amended) An imaging system as in claim 1 wherein said first subcircuit and said second subcircuit are adjusted such that said first gradient shield coil has a resistance equal to said second gradient shield coil.
4. (Currently Amended) An imaging system as in claim 1 wherein:  
said first gradient shield coil comprises a plurality of first shield winding turns; and

said second gradient shield coil comprises a plurality of second shield winding turns, said plurality of second shield winding turns having a non-identical ~~the same~~ number of turns as said plurality of first shield winding turns.

5. (Original) An imaging system as in claim 1 wherein:

said first gradient shield coil comprises a plurality of first shield winding turns and a plurality of winding gaps, each of said plurality of winding gaps formed between consecutive turns of said plurality of first shield winding turns; and

said second gradient shield coil comprises a plurality of second shield winding turns, each of said plurality of second shield winding turns positioned within one of said winding gaps.

6. (Original) An imaging system as in claim 5 wherein said plurality of first shield winding turns and said plurality of second shield winding turns are positioned within a single winding plane.

7. (Original) An imaging system as in claim 1 wherein said shield coil assembly comprises a plurality of winding turns formed in an asymmetrical pattern.

8. (Original) An imaging system as in claim 1 wherein:

said first gradient shield coil comprises a plurality of first shield winding turns forming a first sub-coil;

said second gradient shield coil comprises a plurality of second shield winding turns forming a second sub-coil, said second sub-coil positioned linearly adjacent to said first sub-coil and positioned within a single winding plane.

9. (Currently Amended) An imaging system comprising:

A primary gradient coil assembly; and

A shield coil assembly surrounding said primary gradient coil assembly, said shield coil assembly comprising:

a first gradient shield coil; and

a second gradient shield coil connected in parallel to said first gradient shield coil;

a pair of voltage rails in communication with said first gradient shield coil and said second gradient shield coil;

a first subcircuit in communication with said first gradient shield coil;  
and

a second subcircuit in communication with said second gradient shield coil, said first subcircuit and said second subcircuit independently adjustable such that the currents through said first gradient shield coil and said second gradient shield coil may be independently adjusted;

wherein said shield coil assembly comprises a plurality of winding turns formed in an asymmetrical pattern.

10. (Original) An imaging system as in claim 9 further comprising

at least one additional gradient shield coil connected in parallel to said first gradient shield coil and said second gradient shield coil.

11. (Currently Amended) An imaging system as in claim 9 wherein said first subcircuit and said second subcircuit are adjusted such that said first gradient shield coil has a resistance equal to said second gradient shield coil.

12. (Currently Amended) An imaging system as in claim 9 wherein:

said first gradient shield coil comprises a plurality of first shield winding turns; and

said second gradient shield coil comprises a plurality of second shield winding turns, said plurality of second shield winding turns having a non-identical ~~the same~~ number of turns as said plurality of first shield winding turns.

13. (Original) An imaging system as in claim 9 wherein:



said first gradient shield coil comprises a plurality of first shield winding turns and a plurality of winding gaps, each of said plurality of winding gaps formed between consecutive turns of said plurality of first shield winding turns; and

said second gradient shield coil comprises a plurality of second shield winding turns, each of said plurality of second shield winding turns positioned within one of said winding gaps.

14. (Original) An imaging system as in claim 9 wherein:

said first gradient shield coil comprises a plurality of first shield winding turns forming a first sub-coil;

said second gradient shield coil comprises a plurality of second shield winding turns forming a second sub-coil, said second sub-coil positioned linearly adjacent to said first sub-coil and positioned within a single winding plane.

15. (Original) An imaging system as in claim 13 wherein said plurality of first shield winding turns and said plurality of second shield winding turns are positioned within a single winding plane.

16. (Cancelled) An imaging system as in claim 9 wherein said shield coil assembly comprises a plurality of winding turns formed in an asymmetrical pattern.

17. (Currently Amended) A method of reducing the fringe field generated by a primary gradient coil assembly comprising:

running a first current through a first gradient shield coil connected in parallel to the primary gradient coil assembly; and

running a second current through a second gradient shield coil connected in series to the primary gradient coil assembly, said second gradient shield coil connected in parallel to said first gradient shield coil;

adjusting said first current and said second current independently to minimize the fringe field.

18. (Cancelled) A method as described in claim 17, wherein said first current is equal to said second current.

19. (Cancelled) A method as described in claim 17, further comprising:

adjusting said first current and said second current independently to minimize the fringe field.

20. (Original) A method as described in claim 17, wherein said first current and said second current are passed through an equal number of winding turns.

21. (Original) A method as described in claim 17, wherein said first gradient shield coil and said second gradient shield coil share a single winding plane.

**REMARKS**

Claims 1-21 are pending in the above application. Claims 1-21 were rejected under 35 USC 102 (a) as being anticipated by Joseph (US 6,456,076).

**Claims 1-21 rejected under 35 USC 102 (a)**

Claims 1-21 were rejected under 35 USC 102 (a) as being anticipated by Joseph (US 6,456,076). The Office Action asserts that the Joseph reference teaches all of the limitations of the present invention. The Applicant respectfully disagrees and requests reconsideration in light of the aforementioned amendments and the present arguments.

A novel inventive aspect of the present invention was its ability to handle multiple (more than two) shield windings sharing a similar plane. It was recognized in paragraph 32 of the specification that matched windings and winding length may not be feasible using multiple shield coils. Therefore, the present invention addresses a concern and failing not addressed by Joseph. By including independently controllable sub-circuits, the present invention can independently control currents through the shield coils (even though they are in parallel). This provides a much greater flexibility of coil selection that taught by Joseph. In addition, it paves the way for the claimed asymmetrical windings claimed by the present invention (see Claim 6 and Claim 9). This feature is not taught by Joseph and is particularly adapted to the present invention since variations in shield windings generated by the asymmetric format can be independently adjusted using the structure of the present invention. Thus the present invention contains limitations not taught, rendered obvious, or even considered by Joseph.

In addition, the present invention claims an additional (or third) shield coil in parallel with the others and in series with the gradient (see Claim 2). This should not be quickly dismissed as obvious. The increase in number of shield coils in parallel significantly impacts the variations generated in field by each shield when they are not exactly matched in windings and length. This concern is not addressed by Joseph. The present invention makes such expanded shielding scenarios possibly where previously impractical due to the independent control over each shielding set.

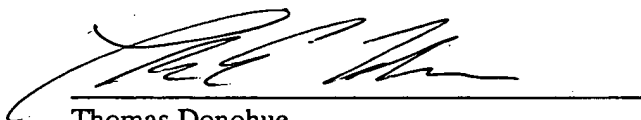
The Applicant respectfully requests reconsideration in light of the aforementioned amendments and remarks.

CONCLUSION

The Applicant would like to thank the Examiner for his assistance. In light of the above amendments and remarks, Applicant submits that all objections and rejections are now overcome. Applicant has added no new material to the application by these amendments. The application is now in condition for allowance and expeditious notice thereof is earnestly solicited.

Should the Examiner have any questions or comments that would place the application in better condition for allowance, the Examiner is respectfully requested to call the undersigned attorney.

Respectfully submitted,



Thomas Donohue  
Reg. No. 44,660  
Artz & Artz, P.C.  
28333 Telegraph Road, Suite 250  
Southfield, MI 48034  
(248) 223-9500  
(248) 223-9522 (Fax)

Dated: May 17, 2004